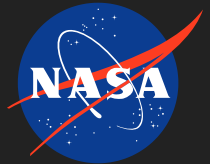


Deep UV Blocking Particle Filter, Phase I

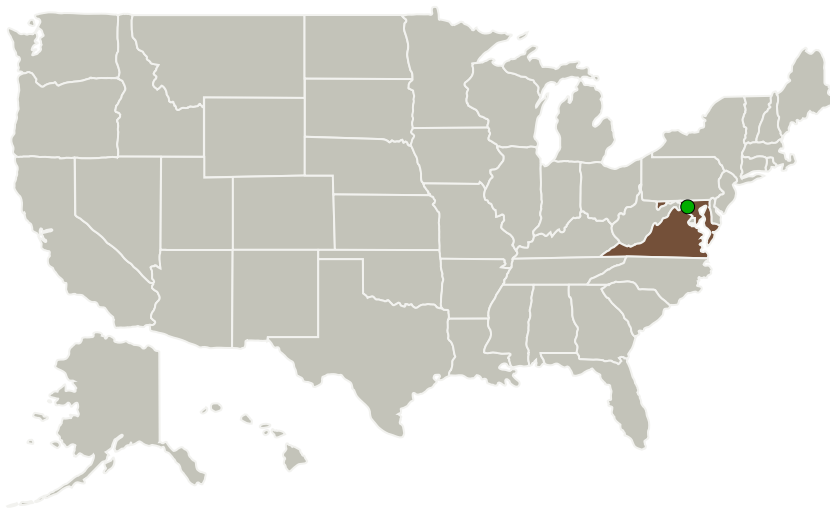
Completed Technology Project (2016 - 2016)



Project Introduction

For sensitive detection of neutral and charged particles in satellite survey missions, instrumentation for the efficient rejection of EUV, Deep UV and visible flux is needed that also efficiently transmits the particles. At present, commercially available filters offer deep UV rejection, limited particle transmission efficiency, and limited lateral dimensions. The team of MicroXact Inc., Virginia Tech and Old Dominion University (ODU) is proposing to develop a deep UV blocking particle filter for NASA and commercial applications that will combine superior mechanical stability, with efficient UV blocking and high particle transmission efficiency. The proposed filter is based on macroporous silicon with conformal pore wall coating by Atomic Layer Deposition. In Phase I of the project the team will finalize the design of the MPSi structure, will make two iterations in fabrication of the filter prototype and will perform testing of both UV rejection and particle transmission to fully validate the proposed approach. In Phase II the team will optimize the material fabrication, and design and fabricate a packaged UV blocking particle filter that will fully comply with NASA specifications and will perform testing in a relevant environment. The filters developed on this SBIR project will be commercialized in Phase III.

Primary U.S. Work Locations and Key Partners



Proposal No. S1.02-7507 - *Wider Scale TRL Wave Converter*

PI: Dr. Vladimir Kochergin
MicroXact Inc. - Blacksburg, VA

Identification and Identification of Inception
Wide-scale cryogenic particle rejection for frequencies above 100GHz is needed for pre-qualification and testing of future (satellite) and passive (instrumentation) sensors that are used by NASA for a wide range of science and engineering applications. MicroXact Inc. is proposing to develop a macroporous silicon (MPSi) wave converter particle filter that will reject all energy above a desirable frequency (100 - 1000 GHz) or higher. The proposed concept is based on MicroXact patent-pending multi-layer cryogenic particle filter design that enables utilization of CMOS components for >100GHz frequency testing, including standard amplifiers, mixers, waveguides, and high frequency probes, all of which are readily available and well known to cryogenic temperatures. Expected TRL: Stage 1 of the end of Contract 1.5-20-1-7.

Technical Objectives and Work Plan
Technical Objectives:
*Task 1 - Design the TRL wave and CCR wave probe and verify it meeting program goals for material processing.
*Task 2 - Build a prototype probe array and experimentally demonstrate low loss transmission at 100GHz when the probe array is at 10K or below.
*Task 3 - Develop strategies for product commercialization and transition to manufacturing.
Work Plan:
*Task 1 - 100 GHz prototype model of the Phase I test setup and TRL wave probe array.
*Task 2 - Process components and build demonstration cryogenic probe array.
*Task 3 - Demonstrate low loss 100GHz transmission at below 10K.
*Task 4 - Create 2nd generation model and set of documentation, master layout and TRL transmission.
*Task 5 - Enhance the commercialization strategy.

NASA and Non-NASA Applications
*Value testing of microwave sensors (active and passive) that are used for measuring precipitation, cloud, for planetary landing, upper atmosphere monitoring, and global wave coverage. *Passive measurement and other Earth and planetary science applications (NASA).
*Value testing of microwave sensors (active and passive) that are used for various defense applications (DOD).
*Value testing of high frequency electronic components and circuits (Dell, commercial).

Team Contacts
Dr. Vladimir Kochergin, CEO/President, MicroXact, (410) 917-7205, vkochergin@microxact.com
Mr. Shiva Kochergin, CFO, MicroXact, (410) 918-0949, skochergin@microxact.com

NON-PROPRIETARY DATA

Characteristics of silicon with the coating system architecture include:
*Material: Silicon
*Structure: 100% crystalline silicon
*Process: 100% crystalline silicon
*Material: Silicon
*Structure: 100% crystalline silicon
*Process: 100% crystalline silicon

Deep UV Blocking Particle Filter, Phase I

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Deep UV Blocking Particle Filter, Phase I

Completed Technology Project (2016 - 2016)



Organizations Performing Work	Role	Type	Location
MicroXact, Inc.	Lead Organization	Industry	Radford, Virginia
● Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland	Virginia
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Project Transitions

▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139816>)

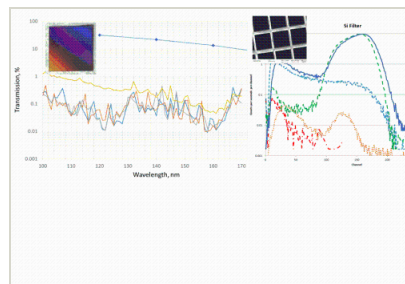
Images



Briefing Chart Image

Deep UV Blocking Particle Filter,
Phase I

(<https://techport.nasa.gov/image/128792>)



Final Summary Chart Image

Deep UV Blocking Particle Filter,
Phase I Project Image

(<https://techport.nasa.gov/image/129352>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MicroXact, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

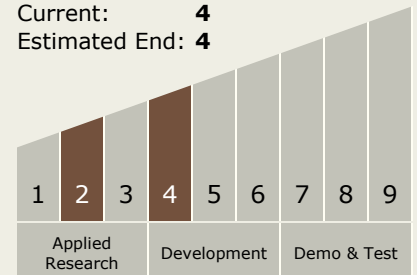
Vladimir Kochergin

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



Deep UV Blocking Particle Filter, Phase I

Completed Technology Project (2016 - 2016)



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System